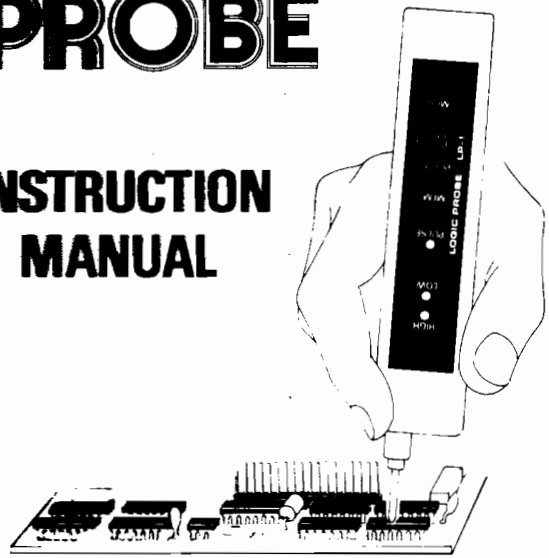
LP-1 LOGIC PROBE

INSTRUCTION MANUAL



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148 Mendell Street, San Francisco, CA 94124
Shire Hill Industrial Estate, Units 1 and 2,
Saffron Walden, Essex, CB 11 3AQ

GLOBAL SPECIALTIES CORPORATION

SPECIFICATIONS

INPUT IMPEDANCE	100,000 Ohms	
THRESHOLDS	Switch selectable	
	DTL/ TTL	HTL/ CMOS
Logic 1 (HI)	2.25V ± 0.15	70% V_{CC}
Logic 0 (LO)	0.80V ± 0.10	30% V_{CC}
MIN. DETECTABLE PULSE WIDTH	50 nanoseconds	
MAX. INPUT SIGNAL FREQUENCY	10 MHz	
PULSE DETECTOR	High speed pulse train or single events (+ or − transitions) activate 1/3 second pulse stretcher, light PULSE LED.	
PULSE MEMORY	Switch selectable. Pulse or level transition detected and stored until reset, keeping PULSE LED lighted.	
INPUT OVERLOAD PROTECTION	± 40V continuous 117VAC for less than 15 seconds.	
POWER REQUIREMENTS:	5 Volt V_{CC} @ 30 mA 15 Volt V_{CC} @ 40 mA 30 Volts max, with power lead reversal protection.	
OPERATING TEMPERATURE	0° to 50° C	
PHYSICAL SIZE L x W x D	6.05 x 1.0 x 0.7" (147 x 25.4 x 17.8mm)	
WEIGHT	3 oz. (0.85 kg)	
POWER LEADS	24" (610mm) with color coded insulated clips.	

CONGRATULATIONS

You are now part of the growing family of Global Specialties Corporation test equipment owners. Your multi-family Logic Probe is a sensitive and unique instrument. In order to obtain maximum benefit from you LP-1, please read this manual carefully.

CAUTION

DO NOT UNDER ANY CIRCUMSTANCES CONNECT THE ALLIGATOR CLIP POWER LEADS OF THIS INSTRUMENT TO MORE THAN 30VDC. **DO NOT** CONNECT THEM TO ANY SOURCE OF AC POWER, AND ESPECIALLY, **DO NOT CONNECT THEM TO AC LINE VOLTAGES!** FAILURE TO COMPLY WITH THESE INSTRUCTIONS RESULTS IN DESTRUCTION OF YOUR INSTRUMENT AND POTENTIAL HAZARD TO YOU. NO FACTORY SERVICE OR WARRANTY SERVICE CLAIMS WILL BE HONORED FOR UNITS WHICH HAVE BEEN CONNECTED TO THE AC LINE.

INTRODUCTION

Global Specialties Corporation's multi-family Logic Probe, LP-1, detects, memorizes and displays logic levels, pulses and Voltage transients in mixed and single logic family systems.

It detects out-of-tolerance logic signals, open circuit nodes, as well as transient events down to 50 nanoseconds while providing the user with an instant easily interpreted high-intensity LED readout.

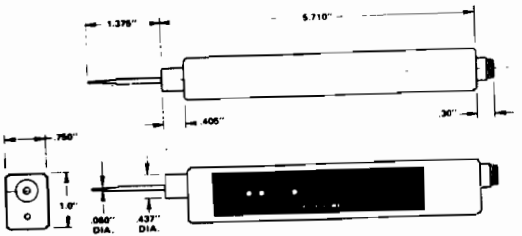
CIRCUIT DESCRIPTION

The probe tip of the LP-1 is connected to a dual threshold window comparator and a bi-polar edge detector. The window comparator bias network establishes the LOGIC "1" and LOGIC "0" threshold levels. The levels are fixed in the DTL/TTL mode (2.25 Volts and 0.8 Volts) in the CMOS/HTL mode, the thresholds are determined by the applied Vcc Voltage – LOGIC "1" > 70% Vcc, LOGIC "0" < 30% Vcc.

The bi-polar edge detector responds to both positive and negative transitions and drives a pulse stretcher circuit. The pulse stretcher converts level transitions as well as narrow pulses to 1/3 of a second pulses that drive one of the three readout LEDs. In the memory mode, the output of the edge detector is fed to a latching flip-flop.

OPERATING INSTRUCTIONS

Just connect the LP-1's clip leads to the circuit's power supply; set the logic family switch to DTL/TTL or CMOS/HTL and the MEMORY/PULSE switch to the PULSE position. Touch the probe tip to the circuit node to be analyzed. The three display LEDs on the probe body will instantly provide a reading of the signal activity at the node. The memory mode of the LP-1 is used to detect, store and display low rep rate or single shot pulses as well as transient events even when an observer is not available to see them occur.



CONTROLS AND CONNECTIONS

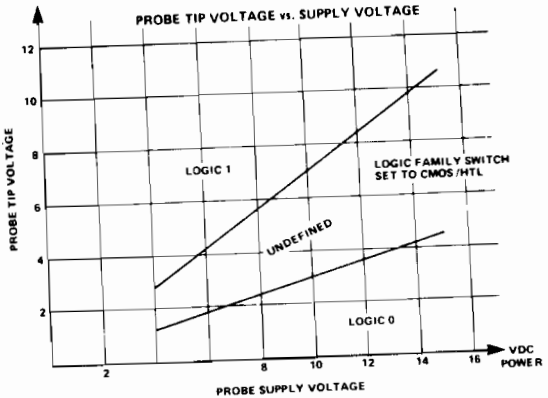
APPLYING POWER TO THE PROBE:

The LP-1 is protected against over-Voltage and reverse Voltage on its power leads. Connect the black clip lead to the common (–) and the red clip lead to plus (+) Vcc. In order to minimize the possibility of power supply spikes, or other spurious signals from affecting the operation of the probe, connect the power leads as close to the node to be tested as possible.

SETTING THE SWITCHES:

Logic Family DTL/TTL, CMOS:

Setting the Logic Family switch to the DTL/TTL position programs the LP-1's window comparator for LOGIC "1" of 2.25 Volts ± .15 Volts and a LOGIC "0" of 0.8 Volts ± .10 Volts. In the CMOS position, LOGIC "1" and LOGIC "0" levels are determined by the applied Vcc. LOGIC "1" > 70% Vcc and LOGIC "0" < 30% Vcc. HTL operating at 15 Volts have LOGIC "1" and LOGIC "0" thresholds specified at > 8.5 Volts and < 6.5 Volts. They compare favorably to the 70/30% programming of the LP-1 in the CMOS mode. LOGIC "1" and LOGIC "0" levels can be user defined by using a power source external to the circuit supply.



NOTE: THE COMMON OR GROUND POINT FROM THE EXTERNAL SUPPLY MUST BE CONNECTED TO THE CIRCUIT UNDER TEST COMMON LINE.

Memory/Pulse Switch – Pulse Position

Each time the input signal changes state (i.e., Logic 1 → 0 or Logic 0 → 1), the pulse LED is activated for 0.3 seconds. When observing low frequency, low duty cycle signals, the PULSE LED provides an immediate indication of the pulse activity at the

node under test. By observing the HI and LO LEDs, the phase of the pulse train can immediately be determined, i.e. if the HI LED is on; the signal is normally high and pulsing low, etc. High frequency signals cause the PULSE LED to flash at a 3 Hertz rate.

Memory/Pulse Switch – Memory Position

The LP-1 contains a pulse memory flip-flop that catches and holds (memorizes) level transitions or pulses as narrow as 50 nanoseconds. The memory is activated by either positive or negative level transitions.

To set the probe for catching and memorizing an event; touch the probe tip to the node under test, move the MEM/PULSE switch to the MEM position. The next event that occurs at the node will activate the PULSE LED and latch it on. To reset and rearm the memory move the MEM/PULSE switch to the PULSE position and then return it to the MEM position.

NOTE: WHEN ARMING THE MEMORY THE PROBE TIP MUST BE IN CONTACT WITH THE NODE UNDER TEST. IF THE MEMORY IS ARMED WITH THE TIP FLOATING (UNCONNECTED) THE MEMORY WILL BE ACTIVATED WHEN THE TIP IS BROUGHT IN CONTACT WITH THE TEST POINT, YIELDING A FALSE READOUT.

INTERPRETING THE LEDS

LED STATES HIGH	LO	PULSE	INPUT SIGNAL	
○	●	○		LOGIC "0" NO PULSE ACTIVITY
●	○	○		LOGIC "1" NO PULSE ACTIVITY
○	○	○		ALL LEDS OFF 1. TEST POINT IS AN OPEN CIRCUIT. 2. OUT OF TOLERANCE SIGNAL. 3. PROBE NOT CONNECTED TO POWER. 4. NODE OR CIRCUIT NOT POWERED.
●	●	*		THE SHARED BRIGHTNESS OF THE HI AND LO LEDS INDICATE A 50% DUTY CYCLE AT THE TEST POINT.(<100KHz)
○	○	*		HIGH FREQUENCY SQUARE WAVE (>100KHz) AT TEST NODE. AS THE HIGH FREQUENCY SIGNALS DUTY CYCLE SHIFTS FROM A SQUARE WAVE TO EITHER A HIGH OR LOW DUTY CYCLE PULSE TRAIN EITHER THE LO OR HI LED WILL BECOME ACTIVATED.
○	●	*		LOGIC "0" PULSE ACTIVITY PRESENT POSITIVE GOING PULSES SINCE HI LED NOT "ON" PULSE TRAIN DUTY CYCLE IS LOW RE < 15%. IF THE DUTY CYCLE WERE INCREASED ABOVE 15% HI LED WOULD START TO TURN ON.
●	○	*		LOGIC "1" PULSE ACTIVITY PRESENT NEGATIVE GOING PULSES, SINCE LO LED NOT "ON" PULSE TRAIN DUTY CYCLE IS HIGH RE > 85% IF THE DUTY CYCLE WERE REDUCED TO <85% "LO" LED WOULD START TO TURN ON.

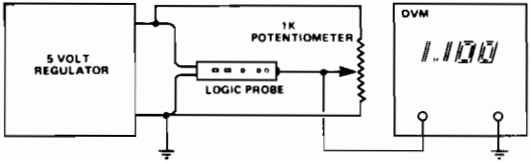
● LED ON
○ LED OFF
* BLINKING LED

TESTING THE LP-1

LOGIC LEVEL TEST

TEST EQUIPMENT NEEDED:

5 VDC regulated power supply
3½-digit DVM, 1 MegOhm input
1K linear potentiometer



LOGIC LEVEL TEST CIRCUIT

DTL/TTL TEST

1. DTL/TTL – CMOS Switch in the DTL/TTL Position
2. PULSE/MEM Switch in the Pulse Position
3. Adjust the 1K Potentiometer until the Low LED goes on

   Max. Logic "0" Voltage 0.9 Volts
   Min. Logic "0" Voltage .07 Volts
4. Adjust the 1K Potentiometer until the HI LED goes on.

   Max. Logic "1" Voltage 2.55 Volts
   Min. Logic "1" Voltage 2.10 Volts

CMOS TEST

1. DTL/TTL – CMOS Switch in the CMOS Position.
2. PULSE/MEM Switch in the Pulse Position.

3. Adjust the 1K Potentiometer until the LO LED lights.

   Max. Logic "0" Voltage 1.7 Volts
   Min. Logic "0" Voltage 1.35 Volts
4. Adjust the 1K Potentiometer until the HI LED lights.

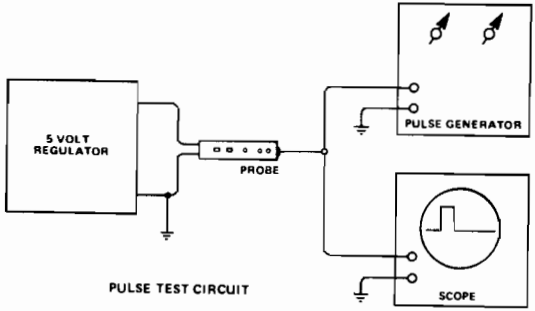
   Max. Logic "1" Voltage 3.85 Volts
   Min. Logic "1" Voltage 3.15 Volts

To test CMOS Logic Levels above 5 Volt Vcc: Refer to CMOS/Vcc Graph on Page 5. Logic Levels should be within ±10% of curves.

PULSE TEST

TEST EQUIPMENT NEEDED:

5 VDC regulated power supply
Pulse generator output 600 Ohms or less (CSC Model 4001 or equivalent)
Oscilloscope, input 1 MegOhm or more
Shunt capacitor, 10pF or less



PULSE TEST CIRCUIT

DTL/TTL TEST

1. DTL/TTL – CMOS Switch in the DTL/TTL Position.
2. PULSE/MEM Switch in the Pulse Position.
3. Pulse Generator set to:

4. Pulse LED will flash.

MEMORY TEST

1. PULSE/MEM Switch in the MEM Position.
2. Test in the Pulse Test Circuit.
4. Pulse LED will stay on.

NOTE: The Pulse Detection Circuitry is independent of the DTL/TTL Switch Position.

ACCESSORIES

LDA-1	1.5" Long Tip - Standard.
*LDA-2	2.5" Long Tip - Optional.
*LDA-3	3" Long E-Z Hook and Adapter for use in place of tip - Optional.
*LDA-4	3" Long Ground Clip with E-Z Hook - Optional.
*LDA-5	3" Long Ground Alligator Clip. with LP-3 only - Standard. Optional.
*LDA-6	Test Prod Tip Adapter (Converts tip to E-Z Hook) - Optional.
*LDA-7	Standard Banana Plug (Converts tip for insertion into Banana Plug) - Optional.
LDA-8	36" Power/Ground Leads with Alligator Clips - Standard.
*LDA-9	36" Power/Ground Leads with E-Z Hooks - Optional.
*LDA-A	All asterisked items available in kit form.

FACTORY SERVICE AND REPAIR

Global Specialties Corporation will service and repair your LP-1 free of charge for a period of one full year. (See Warranty) Please return your LP-1, shipping charges prepaid, in its original box with a copy of sales slip or original invoice to:

GLOBAL SPECIALTIES CORPORATION
70 FULTON TERRACE
P.O. BOX 1942
NEW HAVEN, CONNECTICUT 06509

ATTN: SERVICE DEPARTMENT

Your LP-1 will be repaired, retested and promptly returned to you. If your LP-1 needs servicing and is out of warranty, follow the above instructions and enclose $10.00 for Factory Service. This amount covers most routine repairs; if damage to your unit is more extensive, we will advise you of additional costs before proceeding.

WARRANTY

Global Specialties Corporation warrants this device to be free from defective material or workmanship for a period of one full year from date of original purchase.

Global Specialties Corporation under this warranty is limited to repairing or replacing the defective device when returned to the factory, shipping charges prepaid, within one full year from date of original purchase.

Units returned to Global Specialties Corporation that have been subject to abuse, misuse, damage or accident; have been connected, installed or adjusted contrary to the instructions furnished by Global Specialties Corporation or repaired by unauthorized persons will not be covered by this warranty.

Global Specialties Corporation reserves the right to discontinue models; change specifications, price or design of this device at any time without notice and without incurring any obligation whatsoever.

The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees or agents.

Global Specialties Corporation shall not be liable in any way for consequential damages resulting from use of this device.

This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Global Specialties Corporation is authorized to assume any other obligation in connection with the sale and purchase of this device.